

Edexcel Chemistry A-level

Practical 4

Rates of hydrolysis of halogenoalkanes.

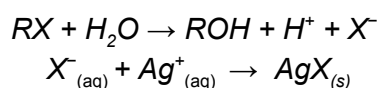


Method

1. Set up 3 test tubes, each with 1 cm³ of ethanol and two drops of a haloalkane. [iodo/bromo/chloro alkanes]
2. Place the test tubes in a water bath (60 °C), along with a test tube of 0.1 mol dm⁻³ silver nitrate and leave all to reach a constant temperature.
3. Quickly add 1 cm³ of a solution of silver nitrate to each test tube containing a haloalkane, and start a stopwatch.
4. Measure and record the time taken for the precipitates to form in each of the test tubes (this is a measure of the rate of reaction).

Key points

- This is **nucleophilic substitution** where water acts as the nucleophile (hydrolysis).
- Precipitation with Ag⁺:



- The variables you control should be either the **nature of the halide** (changing Cl, Br and I within a particular haloalkane), or the **type of alkane** (primary, secondary, tertiary with one type of halide). **Only change a single variable.**

Errors

- Use **water bath** to control the temperature.
- Use lower temperatures to reduce the rate of reaction. This will make the time differences will be more pronounced producing a **lower uncertainty**.

Expected Results

Haloalkane	Result
Chloroalkane	White precipitate forms slowly.
Bromoalkane	Cream precipitate forms faster than chloro but slower than iodo.
Iodoalkane	Yellow precipitate forms quickly.

These results reflect the **relative carbon-halogen bond strengths**. C-I is the weakest bond in this series, so the reaction is the fastest

